

Date: June 7, 2005

To: Jim Anderson, DEQ NWR, Portland Harbor Project Manager

From: Jennifer Peterson, DEQ NWR, Toxicologist, Lower Willamette Section

RE: Process for Selecting Acute and Chronic Water Screening levels for the Portland Harbor Surface Water, Groundwater, and Transition Zone Water, DRAFT, April 29, 2005, Prepared for The Lower Willamette Group by Windward Environmental

General Comments:

1. The approach for deriving water toxicity values for benthic invertebrates, fish, and amphibians and reptiles is presented as first looking at a federal chronic AWQC, and looking at Oregon AWQC only if a federal number is unavailable. Oregon AWQC for metals are currently based on totals, while federal numbers are currently dissolved numbers. In addition, some current Oregon AWQC may be lower than federal numbers. The consultation process will involve several issues, but one is the total metals versus dissolved issue. EPA's switch to dissolved criteria has brought on a debate on how to regulate exposure to the particulate fraction, given that the dataset used does not include toxicity related to the particulate fraction. Several studies have suggested toxicity associated with the particulate fraction (Erickson *et al.*, 1996; Freeman and Everhart, 1971; Gunderson *et al.*, 1994; USEPA, 1993). For example, through respiratory uptake, aquatic organisms are exposed to dissolved and particulate forms of the metal in the aquatic environment. As fish ventilate, water continuously flows across their gills. Particulate fractions in the water column are suspended, and as pH is lowered at the gill surface, soluble metal ions may be released. Due to these concerns (and others), it is uncertain if or when Oregon's proposed dissolved criteria will be adopted. This consultation will take at least another year, and will likely go significantly longer than that (pers. comm. Marty Fitzpatrick, DEQ WQ). In the interim, DEQ will be using total metal concentrations from Table 20. I have attached a table of Oregon's numbers currently in effect – some are Table 20 numbers and some consist of the newly adopted numbers (table 33).
2. This document seems to focus on ecological risk, and not human health risk – although the ecological processes from water that culminate in fish tissue concentrations are very relevant to the human health risk, as will as risk to higher trophic level ecological receptors such as piscivorous birds and mammals. For example, ambient water quality criteria consider bioaccumulation through the use of BCFs or BAFs with the objective of protecting fish tissue concentrations for human health ingestion (fish ingestion rates may need to be altered for this site), or ingestion by wildlife. This same methodology should be used to develop screening numbers that consider bioaccumulation to ecological receptors of concern as well.

Groundwater is also mentioned in the title – are they talking about groundwater seeps for the ecological risk assessment? Where groundwater daylight in absence of dilution (along beaches, etc.) appropriate SLs should be developed that address ecological risk.

3. Because AWQC do not protect all the species (95%), they may not be protective of all species we are concerned about at this site. Do we agree that AWQCs should be used as risk numbers for all species (e.g. T&E fish)? “The use of 0.05 (protection of 95% of the taxa) to calculate a Final Acute Value does not imply that this percentage of adversely affected taxa should be used to decide in a field situation whether a criterion is too high or too low or just right” (Stephan et al., 1983).

Specific Comments:

1. Section 1.0, Introduction, 2nd Paragraph: All non-detected chemicals should be compared to the SLs appropriate for the assessment of direct effects (acute and chronic) and bioaccumulative effects (fish tissue conc; piscivorous birds and mammals) ecological (or human health – is the HH team doing this separately?) risk assessment, not just the “ecologically derived ACGs” (what do they mean by this exactly?) as described in the QAPP for surface water. The ecologically derived surface water ACGs only looked at direct effects in the QAPP, because the human health criteria were included, and ecological ACGs looking at bioaccumulation had not been developed. This evaluation may identify data gaps, and highlights the advantage of developing the TRVs before the data is collected (which, I believe was the team’s preference).
2. Section 1.0, Introduction, Last Sentence: It should be noted that many SLs based on AWQCs (state or federal) are also standards.
3. Section 2.0, Selection of Water Screening Levels: Depending on the detection limits compared to appropriate threshold levels, COIs may be chemicals that were not detected (footnote 1) – this exercise should flag those where detection limits were inadequate.
4. Section 2.2, Sources of Screening Levels: This document concentrates on *effects based* criteria, but also needs to include water criteria that address bioconcentration / bioaccumulation potential. These can be developed site specifically modeling up to fish tissue from water (food web model) and by using AWQC that include human health and wildlife ingestion.
5. Section 2.2.2, Oregon Water Quality Criteria: Criteria that are more stringent than the Table 20 values are currently being used, but one should note that many are still the Table 20 original values, and will stay this way until the values are

approved by EPA. This will take at least a year, and is likely to take longer. I am including a table of the Oregon values currently in effect.

6. Section 2.2.5, ECOTOX Database and Other literature Sources: When consulting other literature sources to select a value for chronic effects, appropriate chronic data should be search for first on the chemical of concern, and this chronic data should be used before calculating one from an acute value. Also, determining appropriate studies for acute and chronic data could be a repeat of the problems of the TRV effort. We should give them direction on this so as not to duplicate the TRV issues we have for fish and wildlife – e.g. have them list all studies found, plot out the different values, etc.).

Section 2.3, Hierarchy of Selection of Screening Level: These sections discuss acute (2.3.1) and chronic (2.3.2) values, but don't discuss which one is most appropriate for assessing ecological risk in Portland Harbor, or under which circumstances. I would say chronic values should be the priority, and acute values should be used secondarily if no chronic value is available, with an appropriate conversion factor. The majority of the exposure at this site will be chronic (longer term exposure). Oregon's screening level values in guidance only contains chronic values. If an acute value was used in the absence of a chronic value, it was divided by 50 for the acute to chronic conversion.

7. Section 2.3.1, Acute SLs: These should include DEQ's Table 20 values. See general comment on some of the differences. This will matter for metals.

Number one should be the lower of acute federal AWQC or Oregon's appropriate AWQC in effect (see table – some are federal AWQC and some are Table 20 values). DEQ's guidance is a mix of values, so let's take the guidance reference out and cite the original literature so everyone knows what we are talking about. In addition, this table is under revision. It should be noted that if DEQ needed to use an acute value, it was divided by 50 to get an appropriate chronic value – the acute to chronic conversion here is 10.

8. Section 2.3.1, Chronic SLs: I am not sure what is meant by “not based on bioaccumulation”. Some chronic NAWQC are based on protection of humans or other piscivorous organisms rather than just the protection of aquatic organisms from direct effects (so ingestion by wildlife is considered). These should be included – we can make them specific to the ecological risk assessment if human health is doing this separately. This hierarchy should include DEQ's Table 20 values, or revised Table 33 numbers according to the attached table. Before moving away from relevant chronic values to acute values, the literature should be consulted to see if there are any relevant chronic studies. Cite the original literature instead of DEQ's guidance.

Number 2 –The ORNL numbers report the SCV (secondary chronic value) only to protect the aquatic life itself, not by protect the use of aquatic life like the NAWQC (considering bioaccumulation).

Number 5 should move before number 3 and 4 – using chronic data is better than estimating chronic effects from acute data. If converting to a chronic value from an acute, Oregon guidance divides by 50, not 10.

If there is a reasonable surrogate for the chemical in regard to chronic effects, this should be consulted before going to acute effects.

9. Section 2.3.4, Selection of Amphibian-Specific Screening Levels: Chronic amphibian specific hierarchy, #2, should be to consult the literature for a *chronic SL* – not an acute.
10. Section 3.1.4, Total Petroleum Hydrocarbons: We should be using the water TPH numbers that Burt proposed as a part of the groundwater evaluation (I think Burt and Mike P. are putting this together?).
11. Section 3.1, Chemicals Considered as Mixtures: These all need to consider bioaccumulation potential in addition to direct toxicity, which will require a look at the individual congeners in addition to totals. They don't mention DDT and metabolites here, but the isomers should be evaluated separately. For PCBs, totals should be determined from congener analysis for water (I am hoping we got this). This will look at direct toxicity, but not bioaccumulation risk. For these numbers, congener specific values should be determined concentrating on those we are most concerned about for fish, human health, and piscivorous bird and mammal risk.
12. Section 4.0, Screening Data Usability: The text states that if there is an exceedence of a water SL, this line of evidence will be “weighed against results from bioassay tests using co-located sediments, measured chemical concentrations in the sediments compared to sediment guidelines, and invertebrate tissue concentrations compared to TRVs.” The sediment bioassays should be considered a separate line of evidence of invertebrate exposure in that the duration and conduction of the sediment bioassays may not adequately reflect risk from water exposure in the environment.

I am not sure about the last few sentences that indicate if an AWQC is exceeded a species specific search will be done, the location of the exceedence will be considered (as far as habitat), and discussed in the context of the screening results. I would say if you have an exceedence in surface water let's not get into habitat delineation – there is a problem both from a standards and eco risk standpoint.